



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

all

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,183	02/17/2004	Arthur Kenneth Hochberg	06417 USA	1740

23543 7590 03/15/2005

AIR PRODUCTS AND CHEMICALS, INC.
PATENT DEPARTMENT
7201 HAMILTON BOULEVARD
ALLENTOWN, PA 181951501

EXAMINER

RAO, SHRINIVAS H

ART UNIT	PAPER NUMBER
----------	--------------

2814

DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/780,183	Applicant(s) HOCHBERG ET AL.	
	Examiner Steven H. Rao	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 11-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02/17/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>02/17/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The Application as currently filed does not claim priority from any previously filed patent application. Therefore currently, the earliest available date is the U.S filing date namely February 17, 2004.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-10 , are drawn to a process for forming a silicon containing film , classified in class 438 , subclass 216.
- II. Claims 12-14 , are drawn to a process for low temperature (200-600) Chemical vapor deposition of silicon containing film , classified in class 438 , subclass 478 +.
111. Claims 15-16 , are drawn to a reactive mixture compound , classified in class 428 , subclass 323 (Gr. 1700)

Inventions 1 and 11 are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention 1 has separate utility such as high temperature Chemical vapor deposition . Further gr. II can be used for deposition of other materials. See MPEP § 806.05(d).

Inventions 1 and 111 are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process

Art Unit: 2814

(MPEP § 806.05(f)). In the instant case the reactive mixture (product) can be made by implantation instead of low temperature CVD.

Because these inventions are distinct for the reasons given above and the search required for Group *1 is not required for Group 11 or 111, restriction for examination purposes as indicated is proper.

During a telephone conversation with MS. Rosaleen Morris_ Oskanian on March 3, 2005 a provisional election was made with traverse to prosecute the invention of Gr. 1, claims 1-11.

Affirmation of this election must be made by applicant in replying to this Office action.

Claims 12-16 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

The Ids filed on February 17, 2004 has been considered and initialed with instructions to the contract staff to mail a copy of the IDS with the instant Office Action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 to 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (U.S. Patent No. 5,763,021, herein after Young) in view of Hirooka et al. (U.S. Patent No. 5,645,947 herein after Hirooka).

With respect to claim 1 Young describes a process for forming a silicon-containing film, the process comprising : introducing a substrate (Young col. 2 lines 60-65) and gaseous reagents comprising an iodosilane precursor having three or less iodine atoms bound to the silicon atom (Young col. 4 line 17) and at least one reagent selected from an oxygen-containing reactive gas, a nitrogen- containing reactive gas, a hydrogen-containing reactive gas, a silicon-containing precursor, and mixtures thereof (col. 2 lines 19-25) into a reaction chamber, (Young col. 5 line 23).

Young does not specifically describe heating the reaction chamber to one or more temperatures ranging from 200 C to 900C to form the silicon containing film on the substrate provided that if the iodosilane precursor has three iodine atoms bound to the silicon atom then the heating step is conducted at one or more pressures less than 600 Torr.

However Hirooka, patent from the same filed of endeavor describes in Examples 1-17 etc. heating the reaction chamber to one or more temperatures ranging from 200 C to 900C to form the silicon containing film on the substrate provided that if the iodosilane precursor has three iodine atoms bound to the silicon atom then the heating step is conducted at one or more pressures less than 600 Torr to form more stable production of deposited film by controlling the temperature .

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Hirooka's heating the reaction chamber to one or more temperatures ranging from 200 C to 900C to form the silicon containing film on the substrate provided that if the iodosilane precursor has three iodine atoms bound to the silicon atom then the heating step is conducted at one or more pressures less than 600 Torr. (Hirooka e.g. examples -1-5 Torr) to form more stable production of deposited film by controlling the temperature . (Hirooka col. 4 lines 5-10).

With respect to claim 2 Young describes the process of claim 1 wherein the iodosilane precursor is a compound of the formula It_4osiH_n wherein $n = 1, 2, \text{ or } 3$. (hirooka col. 4 lines 30 to 55).

With respect to claim 3 Young describes the process of claim 1 wherein the at least one reagent comprises the nitrogen-containing reactive gas. (Hirooka

With respect to claims 4 Young describes the process of claim 3 wherein the nitrogen-containing reactive gas is selected from ammonia, hydrazine, and mixtures thereof.(Hirooka Col.6 lines 25-35)

Art Unit: 2814

With respect to claim 5 Young describes the process of claim 4 wherein the nitrogen-containing reactive gas is ammonia. (Hirooka Col.6 lines 25-35)

With respect to claim 6 Young describes the process of claim 5 wherein the molar ratio of ammonia to the iodosilane precursor is at least 0.2:1. (Hirooka col. 5 lines 8-10, etc.)

With respect to claim 7 describes the process of claim 3 wherein the at least one reagent comprises the oxygen-containing reactive gas. (Hirooka col. 6 line 32).

With respect to claim 8 describes the process of claim 7 wherein the oxygen-containing reactive gas is at least one selected from O₂, O₃, NaO, NO₂, and mixtures thereof. (Hirooka col. 6 line 32)

With respect to claim 9 describes the process of claim 1 wherein the at least one reagent comprises the oxygen-containing reactive gas. (Hirooka col. 6 line 32).

With respect to claim 10 describes the process of claim 1 wherein the heating is conducted at one or more pressures ranging from 10 mTorr to 20 Torr.(Hirooka examples 0.8-1.00 Torr).


With respect to claim 11, Young describes the semiconductor substrate comprising the silicon containing film produced by the process of claim 1. (Young abs. Line 2, Hirooka abs. Line1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on 8.00 to 5.00.

Art Unit: 2814

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


03/07/05